



Volunteer Lake Assessment Program Individual Lake Reports

SUNAPEE LAKE, SUNAPEE, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	28,863	Max. Depth (m):	31.9	Flushing Rate (yr ⁻¹)	0.3
Surface Area (Ac.):	4090	Mean Depth (m):	11.4	P Retention Coef:	0.7
Shore Length (m):	47,600	Volume (m ³):	188,150,000	Elevation (ft):	1092

TROPHIC CLASSIFICATION

Year	Trophic class
1995	OLIGOTROPHIC
2006	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

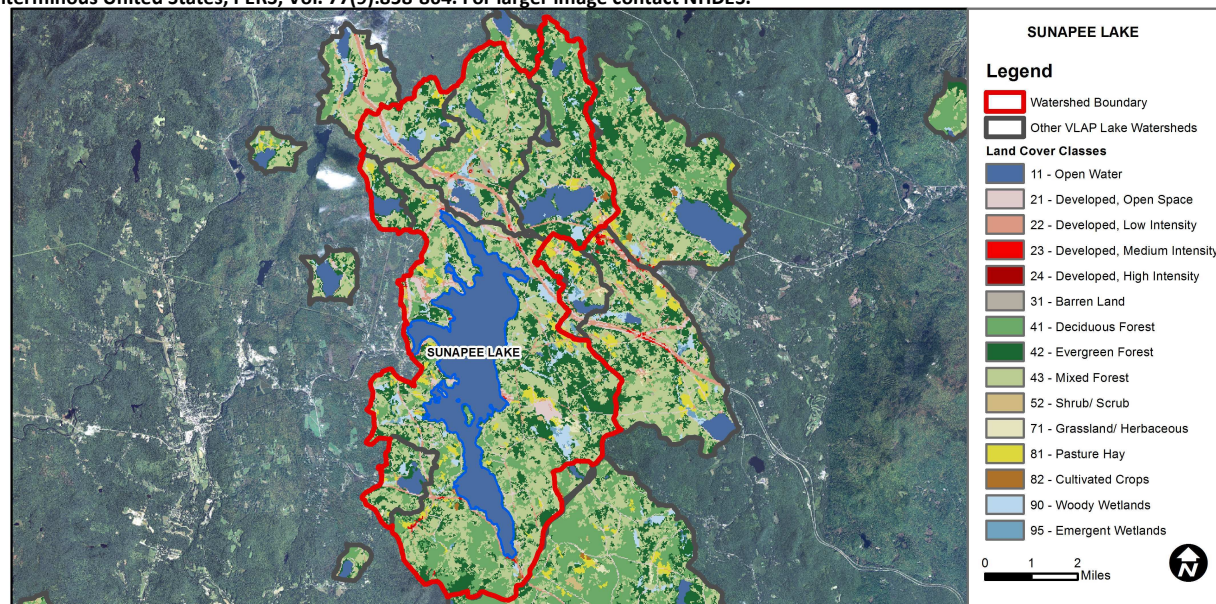
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Bad	There are >10% of samples (minimum of 2), exceeding criteria with one or more samples considered large exceedance.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Very Good	The calculated median is from 5 or more samples and is <= 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

SUNAPEE LAKE - DEPOT BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
SUNAPEE LAKE - GEORGES MILL TOWN BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
SUNAPEE LAKE - SUNAPEE STATE PARK BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
SUNAPEE LAKE - BLODGETT'S LANDING BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
SUNAPEE LAKE - DEWEY (TOWN) BEACH	Escherichia coli	Slightly Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. Exceedances are <2X criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	17.9	Barren Land	0.18	Grassland/Herbaceous	0.44
Developed-Open Space	4.66	Deciduous Forest	12.49	Pasture Hay	2.59
Developed-Low Intensity	2.83	Evergreen Forest	21.94	Cultivated Crops	0.15
Developed-Medium Intensity	0.24	Mixed Forest	31.84	Woody Wetlands	3.2
Developed-High Intensity	0.01	Shrub-Scrub	1.14	Emergent Wetlands	0.3



VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

LAKE SUNAPEE, STNS 010, 020, 030, 070, 080, 090, 100.1, & 110

2015 DATA SUMMARY

RECOMMENDED ACTIONS: Prior to the initial June sampling events, make sure the interiors of all integrated tubes are rinsed and dried to remove any debris that may have built up over the winter. If surface pollen levels are high, try to collect samples free of pollen if possible. Phosphorus and turbidity levels were lower in 2015 and transparency was generally higher (better). The dry summer and lack of stormwater runoff likely contributed to the improved measurements. This highlights the importance of stormwater management in the watershed. Identify areas prone to stormwater erosion and runoff and implement stormwater management best practices to help capture and infiltrate stormwater prior to entering the lake. Partner with Soak Up the Rain NH to help identify and implement projects. More information can be found at www.soaknh.org/. Conduct chloride monitoring to establish a baseline set of data to help understand what is driving the increasing conductivity trends. Keep up the great work!

OBSERVATIONS AND RECOMMENDATIONS (Refer to Table 1 and Historical Deep Spot Data Graphics)

- **CHLOROPHYLL-A:** Chlorophyll levels fluctuated between an average of 1.25 ug/L at Stations 080 and 110 and 3.58 ug/L at Station 100.1. The higher chlorophyll level at Station 100.1 was due to an elevated chlorophyll reading in June that approached levels indicative of an algal bloom. Chlorophyll levels at all other stations remained within a low range from June through September and were well below the state median. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability between years at all stations.
- **CONDUCTIVITY/CHLORIDE:** Conductivity ranged from approximately 95.0 to 100.0 uS/cm in 2015. Average conductivity levels generally increased at all stations from those measured in 2014 likely due to the severe winter and associated snowmelt as well as the dry summer conditions and groundwater inputs. Average conductivity remained slightly greater than the state median. Historical trend analysis indicates significantly increasing (worsening) conductivity levels at Stns. 010, 020, 030, 070, 090, and 110. Historical trend analysis indicates relatively stable conductivity at Stns. 080 and 100.1.
- **TOTAL PHOSPHORUS:** Phosphorus levels generally decreased in 2015 and were within low ranges at all stations except 070 and 100.1. Phosphorus levels at Stns. 010, 020, 080, 090, and 110 remained stable and low from June through September. Phosphorus levels at Stn. 030 were average in June, decreased to low levels in July, increased to slightly elevated levels in August following a significant storm event, and then decreased to average levels in September. Phosphorus levels at Stn. 070 were elevated in July and August and decreased to slightly elevated levels in September. Phosphorus levels at Stn. 100.1 were greatly elevated in June when algal growth was elevated and decreased to slightly elevated levels in August and September. Phosphorus levels have generally remained within higher ranges at Stns. 030 and 070 since 2006. Phosphorus data was invalidated at Stn. 070 in June and Stn. 100.1 in July due to field duplicate data not meeting acceptance criteria. Historical trend analysis indicates stable phosphorus levels at Stn. 010 with high variability between years. Historical trend analysis also indicates significantly increasing (worsening) phosphorus levels at Stns. 020, 030, 070, 080, 090, 100.1, and 110.
- **TRANSPARENCY:** Average transparency decreased slightly (worsened) from 2014 at Stns. 090 and was particularly low in August although it is unclear what contributed to the lower transparency. Average transparency remained stable from 2014 at Stns. 020, 070, 080, and 100.1, and increased (improved) at Stns. 010, 030 and 110. The Secchi disk was generally visible on the lake bottom at Stns. 020, 070, 080, and 090. Historical trend analysis indicates relatively stable transparency at Stns. 010, 020, 030, 070, 080, 090, and 100.1 with low to moderate variability between years. Historical trend analysis indicates significantly decreasing (worsening) transparency at Stn. 110 since monitoring began.
- **TURBIDITY:** Turbidities at Stns. 010, 020, 030, 070, and 110 were generally within low to average ranges on each sampling event and average turbidity decreased or remained stable from 2014. Turbidities at Stns. 080 and 090 increased slightly from 2014 but were also generally within an average range. Turbidity at Stn. 100.1 was greatly elevated in June which may have been caused by algal growth and/or pollen and could have contributed to the elevated phosphorus, and then decreased to low levels the remainder of the summer. Turbidities were slightly higher in June at Stns. 030, 070, 080, 090, and 110 potentially due to spring snow melt and/or pollen.
- **pH:** Average pH levels were generally within the desirable range 6.5-8.0 units at all Stns. except 030 in 2015. June pH levels were slightly less than desirable at Stns. 010 and 030 potentially due to spring snow melt. Historical trend analysis indicates relatively stable pH with moderate variability between years at Stns. 020, 030, 070, 080, 090, 100.1, and 110. Historical trend analysis indicates significantly decreasing (worsening) pH at Stn. 010 since monitoring began.

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

Chloride: > 230 mg/L (chronic)

E. coli: > 88 cts/100 mL – public beach

E. coli: > 406 cts/100 mL – surface waters

Turbidity: > 10 NTU above natural level

pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.

Alkalinity: 4.9 mg/L

Chlorophyll-a: 4.58 mg/m³

Conductivity: 40.0 uS/cm

Chloride: 4 mg/L

Total Phosphorus: 12 ug/L

Transparency: 3.2 m

pH: 6.6

Station Name	Table 1. 2015 Average Water Quality Data for SUNAPEE LAKE-NEARSHORE						
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	Total P ug/l	Trans. m	Turb. ntu	pH
					VS		
010		1.83	101.0	5	8.50	0.80	6.61
020		1.61	98.2	7	4.30	0.64	6.73
030		1.72	96.0	8	8.75	1.12	6.46
070		1.36	95.4	29	6.70	0.89	6.58
080		1.25	95.6	5	2.00	1.05	6.72
090		1.28	97.0	6	6.90	1.08	6.75
100.1		3.58	100.2	94	7.00	3.30	6.81
110		1.25	98.1	6	6.78	0.86	6.70

HISTORICAL WATER QUALITY TREND ANALYSIS

Station	Parameter	Trend	Explanation
010	Chlorophyll-a	Stable	Data show moderate variability.
	Transparency	Stable	Data show moderate variability.
	Phosphorus	Stable	Data show high variability.
	Conductivity	Worsening	Data significantly increasing.
	pH	Worsening	Data significantly decreasing.
020	Chlorophyll-a	Stable	Data show moderate variability.
	Transparency	Stable	Data show low variability.
	Phosphorus	Worsening	Data significantly increasing.
	Conductivity	Worsening	Data significantly increasing.
	pH	Stable	Data show moderate variability.
030	Chlorophyll-a	Stable	Data show moderate variability.
	Transparency	Stable	Data show low variability.
	Phosphorus	Worsening	Data significantly increasing.
	Conductivity	Worsening	Data significantly increasing.
	pH	Stable	Data show moderate variability.
070	Chlorophyll-a	Stable	Data show moderate variability.
	Transparency	Stable	Data show low variability.
	Phosphorus	Worsening	Data significantly increasing.
	Conductivity	Worsening	Data significantly increasing.
	pH	Stable	Data show moderate variability.

Station	Parameter	Trend	Explanation
080	Chlorophyll-a	Stable	Data show moderate variability.
	Transparency	Stable	Data show moderate variability.
	Phosphorus	Worsening	Data significantly increasing.
	Conductivity	Stable	Data show low variability.
	pH	Stable	Data show moderate variability.
090	Chlorophyll-a	Stable	Data show moderate variability.
	Transparency	Stable	Data show low variability.
	Phosphorus	Worsening	Data significantly increasing.
	Conductivity	Worsening	Data significantly increasing.
	pH	Stable	Data show moderate variability.
100.1	Chlorophyll-a	Stable	Data show moderate variability.
	Transparency	Stable	Data show low variability.
	Phosphorus	Worsening	Data significantly increasing.
	Conductivity	Stable	Data show low variability.
	pH	Stable	Data show moderate variability.
110	Chlorophyll-a	Stable	Data show high variability.
	Transparency	Worsening	Data significantly decreasing.
	Phosphorus	Worsening	Data significantly increasing.
	Conductivity	Worsening	Data significantly increasing.
	pH	Stable	Data show moderate variability.